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ABSTRACT

This self-study course was prepared specifically to be used with the United States Department of Agriculture (USDA) Agriculture Handbook 360, FIRE WEATHER...A GUIDE FOR APPLICATION OF METECROLOGICAL INFORMATION TO FOREST FIRE CONTROL CPERATIONS. It is designed not only to let the reader determine his comprehension of the text but also to develop thorough understanding of the materials and the ability to apply it in the field. The 120 multiple choice questions are generally concerned with the principles of meteorology, rather than with insignificant details. A self-evaluation test is provided. (Author/CP)

LEARNING FIRE WEATHER

A Self-Study Course

FOREST SERVICE

U. S. Department Of Agricultu

T T-89-(5100)

1974

PREFACE

This self-study course was prepared specifically to be used with USDA Agriculture Handbook 360, Fire Weather...A Guide for Application of Meteorological Information to Forest Fire Control Operations. It is designed not only to let the reader determine his comprehension of the text, but to develop through understanding of the material and the ability to apply it in the field. It consists of 120 questions with multiple-choice answers. Many answers are partly correct. The reader must, therefore, consider the question carefully so as not to choose a partly correct answer rather than the "right" answer. Insofar as possible, the questions and answers relate to what might happen in the field or on a fire. They generally are concerned with the principles of meteorology, rather than insignificant details. The test is for self-study purposes only, so there should be no set time schedule. Questions are grouped according to chapters, thereby allowing one chapter to be completed at a time. The Self-Exam Trainer-Tester Answer Sheet is based on the progressive referral method. A referral section furnishes text references that cover the subject discussed in the corresponding problem. The reader should review the text reference and restudy the problem before he makes another choice. He should repeat the process until he obtains the correct answer. By using the progressive referral method, he is, in a sense, teaching himself.

ACKNOWLEDGMENT

I thank Mark J. Schroeder, senior author of Fire Weather, for his guidance and ready assistance in the preparation of this self-study course; Harvey P. Gibson, National Fire Training Center, Forest Service, Marana, AZ; Morris H. McCutchan and Bill C. Ryan, both of the Pacific Southwest Forest and Range Experiment Station, stationed at Riverside, CA, for their support and suggestions.

Issued September 1974

CONTENTS

LEARNING FIRE WEATHER--A SELF-STUDY COURSE

By
Bernadine A. Taylor 1/

INTRODUCTION

This self-study course was prepared specifically to be used with the handbook Fire Weather. 2/ It is designed not only to let you determine your comprehension of the text, but to develop thorough understanding of the material and the ability to apply this understanding in the field. Many answers in the self-training course are partly correct answers. You must, therefore, consider the question carefully so as not to choose a partly correct answer rather than the "right" answer. Insofar as possible, the questions and answers relate to what might happen in the field or on a fire. The questions generally are concerned with the principles of meteorology, rather than insignificant details. If you are a forester or firefighter, you may find that you know some of the answers already, based on your own experience. Yet, upon completion of this course, you will find that you have gained a fuller understanding of the principles of fire weather.

1/ Bernadine A. Taylor is a meteorological technician assigned to fire meteorology research, Pacific Southwest Forest and Range Experiment Station, Forest Service, U. S. Department of Agriculture, Berkeley, CA, and stationed at the Forest Fire Laboratory, Riverside, CA.

2/ Mark J. Schroeder and Charles C. Buck. 1970. Fire Weather...a guide for application of meteorological information to forest fire control operations. USDA Agriculture Handbook 360, 229 p., illus. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, at $4.85 per copy (Catalog No. A1.76:360).

This test is for self-study purposes only, so there should be no set time schedule. Questions are grouped according to the chapters in AH 360. This allows one chapter to be completed at a time.

INSTRUCTIONS

MATERIALS FOR THE COURSE

Do not proceed until you have the following materials:

1. This publication, containing 120 multiple-choice questions and the answers to the questions.

2. The Self-Exam Trainer-Tester Answer Sheet (T-T No. Z4c, Second Series).

3. A copy of Fire Weather (USDA Agriculture Handbook 360).

4. A pencil and an eraser.

USING THE ANSWER SHEET

The Answer Sheet is based on the progressive referral method. The course contains 120 multiple-choice questions. The Answer Sheet contains corresponding answer columns lettered a, b, c and d. Answer blocks appear under the letters. Choose the letter corresponding to the best answer for each question; then refer to your Answer Sheet and lightly erase only the block you choose until a large letter appears. The letters have the following definitions:

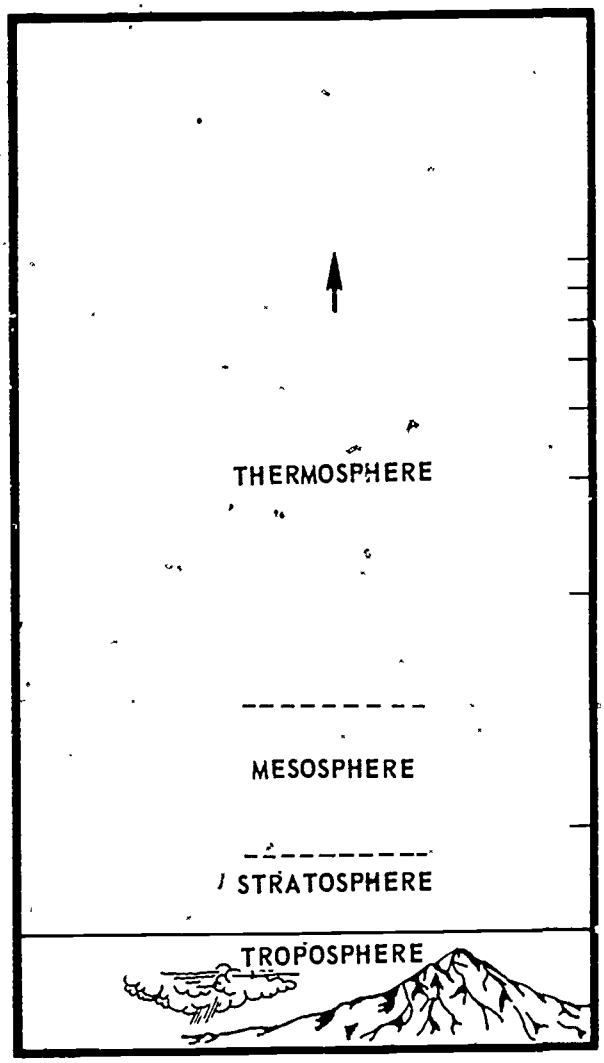
T - True

E, L or H - Partly correct or incorrect answer; additional study is needed.

If a T appears, you have selected the correct answer and should proceed to the next question. If an H, E or L appears, turn to the Referral section of the course with corresponding letters and numbers. For example, refer to H-1 if incorrect letter H appears for your answer to problem number 1. Refer to L-50 if the letter L appears for problem 50, etc. The Referral section furnishes text references that cover the subject discussed in the corresponding problem; review your text reference and restudy the problem before you make another choice. Repeat this process until you obtain the correct answer (T). You are using the progressive referral method; in a sense, you are teaching yourself.

QUESTIONS

Following the above instructions, see if you can obtain the correct answer to this trial question.



CHAPTER 1. BASIC PRINCIPLES

1. Going upward through the troposphere, one normally would expect

a. a decrease in both temperature and wind speed.

b. an increase in both temperature and wind speed.

c. a decrease in temperature and an increase in wind speed.

d. an increase in temperature and a decrease in wind speed.

Under Column c for question 1, the letter "T" for "true" will appear after an erasure. You then could go on to question 2. If you had selected d, an "H" would appear. You then would turn to H in the Referral section, question 1, for self-study information; you then would review the text before making another choice. If you uncovered an "E" or "L", you would be partly correct. Again, you would turn to the corresponding part of the Referral section for further information, review your text reference and make another choice.

Following the above instructions, proceed to question 2.

2. What is the tropopause?

a. The transition zone between the stratosphere and the mesosphere. It usually is the zone of lowest wind speeds and warmest temperatures.

b. The transition zone between the troposphere and the stratosphere. It usually is a zone of light winds and minimum temperatures.

c. The transition zone between the troposphere and the stratosphere. It usually is a zone of atmospheric temperature minimum and indicates the approximate top of convective activity.

d. The transition zone between the stratosphere and the mesosphere. It usually is a zone of atmospheric temperature minimum and indicates the approximate top of convective activity.

3. "Standard atmospheric pressure" is best defined as

a. the total atmospheric pressure exerted at sea level.

b. the variable pressure at sea level. It averages 1130.25 millibars.

c. a column of air from sea level to the top of the atmosphere; it is equivalent to 29.92 millibars.

d. the average weight of a column of air of unit cross section extending from sea level to the top of the atmosphere; it equals 14.7 pounds per square inch.

4. The amount of heat required for sublimation equals

a. the amount required to change ice to water.

b. the sum of the heat of fusion and the heat of vaporization.

c. the sum of the heat of fusion, the heat of vaporization, and 180 B.t.u. per pound of water.

d. the difference of the heat of vaporization and the heat of fusion.

5. The heat required to change 1 pound of ice into liquid water at 32° F. is

a. 144 B.t.u.

b. 212 B.t.u.

c. 180 B.t.u.

d. 972 B.t.u.

6. Explain the difference between "heat of fusion" and "heat of vaporization".

a. "Heat of fusion" is the heat required to convert 1 pound of ice into liquid water at 32° F. and is 972 B.t.u., whereas "heat of vaporization" is the heat required to change 1 pound of water at 212° F. into vapor and is 144 B.t.u.

b. "Heat of fusion" is the heat required to change 1 pound of water at 212° F. into vapor and is 972 B.t.u., whereas "heat of vaporization" is the heat required to convert 1 pound of ice into liquid water at 32° F. and is 144 B.t.u.

c. "Heat of fusion" is the heat required to convert 1 pound of ice into liquid water at 32° F. and is 144 B.t.u., whereas "heat of vaporization" is the heat required to change 1 pound of water at 212° F. into vapor and is 972 B.t.u.

d. "Heat of fusion" is the heat released when 1 pound of liquid water at 32° F. is frozen and is 972 B.t.u., whereas "heat of vaporization" is the heat released when 1 pound of water vapor changes into liquid water at 212° F. and is 144 B.t.u.

7. Convection is

a. atmospheric motion that is predominantly vertical and is the initial motion responsible for the development of wind currents in the atmosphere.

b. the transfer of energy by waves moving at 186,000 miles per second.

c. atmospheric motion extremely important in weather processes, but having little to do with small-scale winds found in areas around fires.

d. the process by which ice will vaporize without first changing to liquid.

8. Moisture in any form absorbs much of the longwave radiation. Therefore,

   a. the deserts cool off so much at night because the greenhouse effect is much greater on the desert.

   b. the amount of moisture in the air determines how warm an area will be.

   c. the greenhouse effect is much greater when humidity is low.

   d. the greenhouse effect is much greater when the air contains more water vapor.

9. If the temperature at the surface is 80° F., and the temperature continues to increase to 2,000 ft. above the ground, where the temperature is 92° F.,

   a. this layer of air would be called an inversion layer, providing it is very dry.

   b. the air in this layer is stable, and would be called an inversion layer.

   c. this layer would be a temperature inversion and one would expect to find a great amount of turbulence.

   d. this layer of air would be very unstable.

10. A layer of air in an unsaturated atmosphere may be considered unstable if

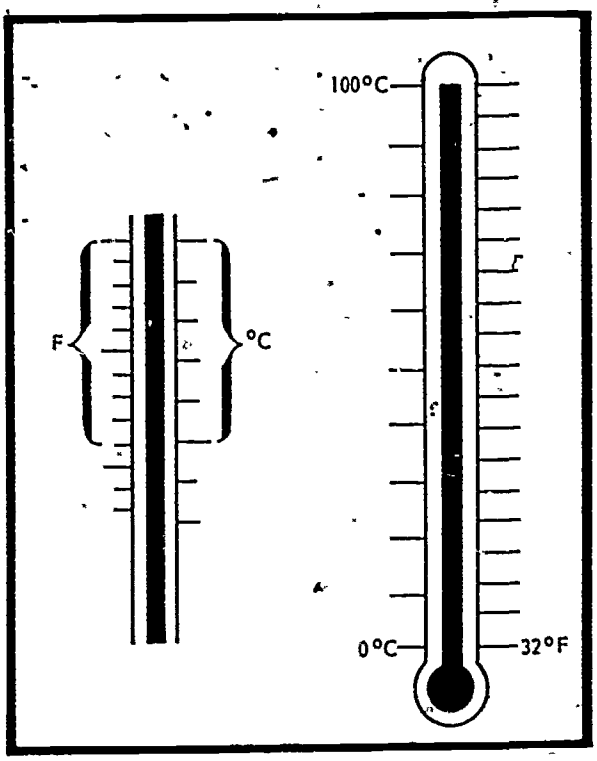
   a. you see clouds.

   b. the lapse rate (decrease of temperature with height) is 4.0° F. per 1,000 ft.

   c. a pilot balloon goes straight up when released.

   d. the lapse rate (decrease of temperature with height) is 6.0° F. per 1,000 ft.

11. Which of the following locations for an instrument shelter would be the best for providing air temperature readings to the fire weather forecaster?



a. Any place near the station, providing local variations could be best measured in that spot?

b. A spot, representative of the area, with maximum exposure to sun and wind and the least interference from local influences.

c. On a ridge, or the windiest spot near the station; so that air can flow freely through the shelter.

d. An area with much shade so that there is no danger of the sun shining on the thermometer bulb.

12. Since topography strongly influences local temperature variations, one would expect to find

a. that a steep slope would receive more total radiation than a flat surface.

b. in general, the highest surface temperatures are on southwest-facing slopes in midmorning.

c. that south-facing slopes receive more nearly direct rays, thus become warmer than north-facing slopes (northern hemisphere).

d. that west-facing slopes reach a maximum temperature at noon.

13. Explain why direct solar radiation heats litter surfaces to temperatures far above the temperature of the overlying air without heating the soil below.

a. Litter is a good reflector of radiation.

b. Dry leaves, needles and dry grass are poor heat conductors; thus they do not readily conduct the heat to the soil below.

c. Litter has a low specific heat, thus it warms up rapidly.

d. Both "b" and "c" are true.

14. Daytime winds help to lower surface temperature because

a. heat is carried away from the heated surfaces by turbulent mixing.

b. they do not; the breeze just makes the air temperature feel cooler.

c. air movement transports moisture away from moist surfaces, thus increasing evaporation and restricting the temperature rise.

d. both "a" and "c" are responsible.

15. When nighttime surface temperatures approach the freezing mark because of outgoing radiation, there is less chance of freezing at the surface if the wind is fairly strong than if the air is calm, because

a. strong winds would help mix the air, moving the warm air aloft downward and in contact with the surface.

b. the surface cools by the heat transfer processes of conduction, radiation and convection, so the amount of cooling at night is <u>not</u> affected by wind.

c. this statement is not true. If winds are blowing strongly at night, there is a better chance that the air will be cooler.

d. the friction caused by the wind would produce heat, thus making the surface warmer.

16. A superadiabatic lapse rate may indicate the occurrence of

a. gusty winds.

b. both "a" and "c".

c. firewhirls within the fire.

d. much ground fog in the low-lying areas.

17. A superadiabatic lapse rate most likely would exist

a. when there is cool, moist air at the surface and warmer air above.

b. when surface heating takes place very rapidly and the air above the surface still is quite cool.

c. when there are clear skies and strong surface winds.

d. whenever there is convective activity.

18. The area along a slope where nighttime air temperatures are warmest is called the thermal belt. The following statement best describes the nighttime conditions above and below the thermal belt:

a. Below the thermal belt the air will be less stable, cooler, and more humid, and above it the air will be more stable, winds will be stronger, and the air will be dryer.

b. Below the thermal belt the air will be more stable, cooler, and more humid, and above it the air will be less stable, winds will be stronger, and air will be dryer.

c. Below the thermal belt the air will be less stable, warmer, and less humid, and above it the air will be more stable, winds will be lighter, and the air will be more moist.

d. Below the thermal belt the air will be more stable, warmer, and less humid, and above it the air will be less stable, winds will be lighter, and the air will be more moist.

19. Coldest nighttime temperatures in mountainous terrain normally would be expected

a. along a slope in an open canyon.

b. at the bottom of a basin or valley.

c. within the inversion.

d. near the top of the inversion.

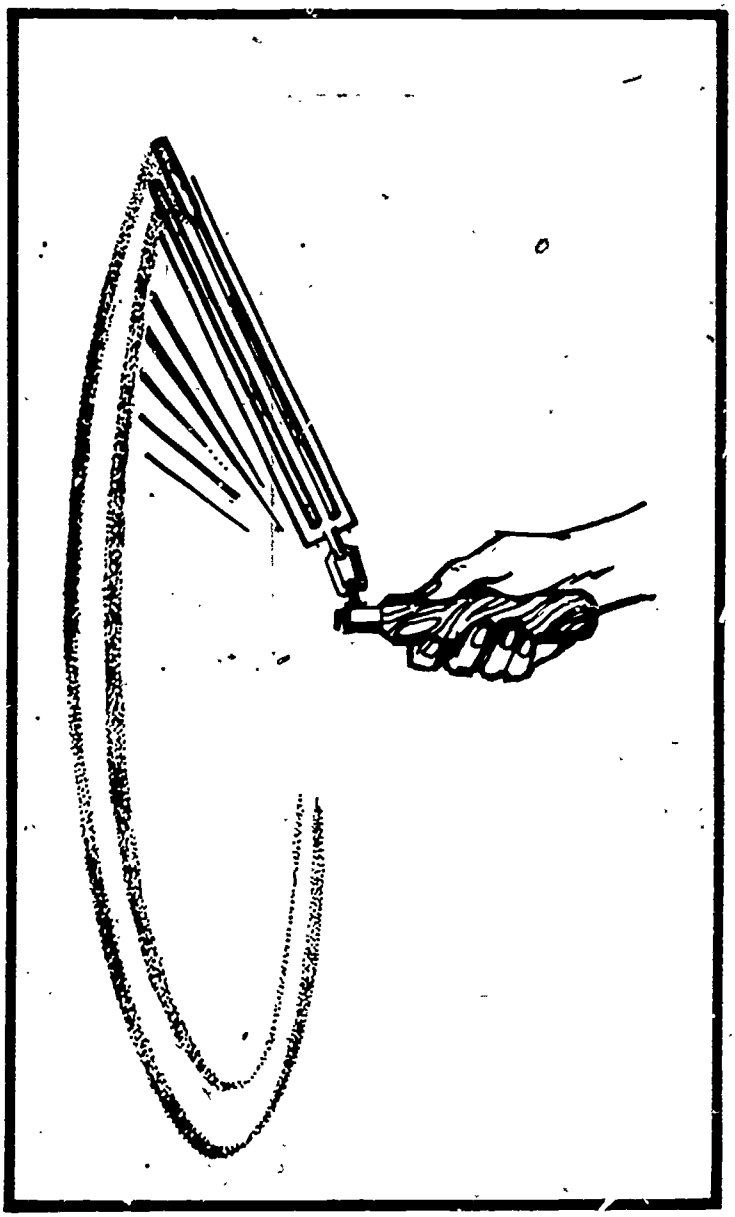
20. The following would help to lower the maximum daytime temperature:

a. clear skies, light winds, low humidities and stable air.

b. clouds, strong winds, low humidities and stable air.

c. clear skies, light winds, high humidities and atmospheric instability.

d. clouds, strong winds, high humidity and atmospheric instability.



CHAPTER 3. ATMOSPHERIC MOISTURE

21. The partial pressure of the atmosphere, owing to water vapor, may vary from

a. a few inches of mercury in warm, moist air to 29.92 inches in cold, dry air.

b. near zero in cold, dry air to about 2 inches of mercury in warm, moist air.

c. near zero in warm, moist air to about 2 inches of mercury in cold, dry air.

d. a few inches of mercury in cold, dry air to 29.92 inches in warm, moist air.

22. "Saturation vapor pressure" is

a. the vapor pressure of the air at 32° F.

b. the vapor pressure of completely saturated air; it is lowest at a high temperature.

c. the vapor pressure of completely saturated air; it varies with temperature.

d. the atmospheric pressure of completely saturated air.

23. Relative humidity is

a. the actual amount of water vapor in a given volume of air, that is, the weight per volume.

b. the ratio, usually expressed in percent, of the amount of moisture in a volume of air to the total amount that volume can hold at the same temperature and atmospheric pressure.

c. the saturation vapor pressure divided by the actual vapor pressure.

d. the amount of moisture in the air; it is dependent on temperature and pressure.

24. Given a dry-bulb temperature of 80° F. and a dewpoint temperature of 78° F., the following would be correct:

a. The air is fairly moist, but more information is needed to determine atmospheric moisture accurately.

b. One cannot assume anything until more meteorological information is obtained.

c. The relative humidity is very high.

d. The relative humidity is close to 100 percent, but a wet-bulb temperature reading is needed in order to determine the relative humidity.

25. Which of the following values can be computed, as described, from wet- and dry-bulb temperature readings?

a. Height above sea level by the amount of moisture that is calculated.

b. Dewpoint temperature and relative humidity by using the psychrometric tables.

c. Dewpoint temperature and the height above sea level by using special tables.

d. All of the above.

26. Transpiration is the process by which water in plants is transferred, as water vapor, to the atmosphere. Under which of the following conditions would most transpiration occur?

a. In an open field of harvested vegetation on a very hot, dry day.

b. In a relatively sparse forest on a warm afternoon.

c. In a dense forest on a cool, rainy day.

d. In a dense forest with much understory on a warm day.

27. When would the most evaporation take place, at a given atmospheric vapor pressure?

a. On a dry, windy afternoon over a warm lake.

b. Over a barren desert at night.

c. Over a lake at night when the wind is blowing steadily onshore.

d. Over a sparse forest when the day is warm and dry.

28. Normally, absolute humidity decreases with height. When would absolute humidity be most likely to <u>increase</u> with height?

a. At night, in a very shallow layer near cold surfaces such as cold soil.

b. When horizontal flow aloft brings in moist air.

c. Both "a" and "b" are correct.

d. When there is a great amount of subsidence.

29. Relative humidity varies directly with the actual amount of moisture in the air and inversely with temperature; therefore,

a. an increase in the actual amount of moisture in the air and a decrease in temperature would increase the relative humidity.

b. a decrease in the actual amount of moisture in the air and an increase in temperature would increase the relative humidity.

c. a decrease in the actual amount of moisture in the air and a decrease in temperature would increase the relative humidity.

d. an increase in the actual amount of moisture in the air and an increase in temperature would increase the relative humidity.

30. The most abrupt relative humidity change normally would be expected

a. at any place where the wind suddenly increases in speed.

b. at a place that is shaded when the sun suddenly goes behind a cloud.

c. ascending a slope where there was much turbulent mixing of air.

d. passing through a marine-subsidence inversion along the west coast.

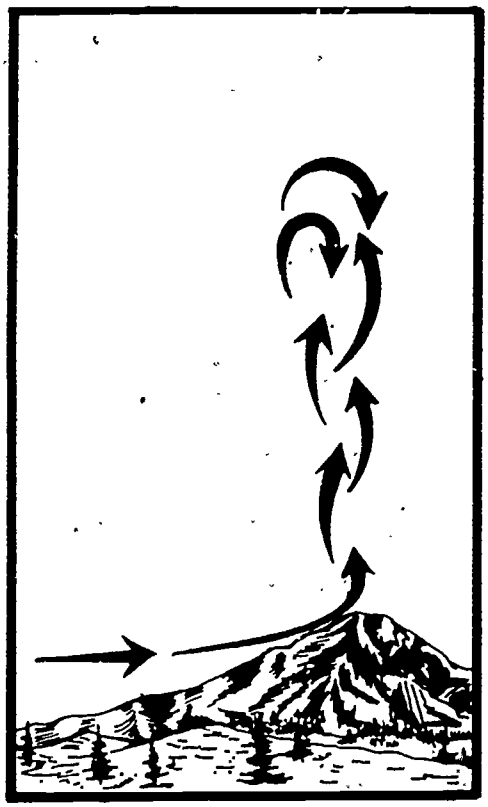
31. Explain how relative humidity varies between forest stands and open areas.

a. Relative humidity normally is lower under a closed canopy than in the open during the day, and higher at night.

b. Relative humidity normally is higher under a closed canopy than in the open during the day, and lower at night.

c. Relative humidity normally is higher under a closed canopy than in the open both day and night.

d. Relative humidity normally is lower under a closed canopy than in the open both day and night.



CHAPTER 4. ATMOSPHERIC STABILITY

32. Atmospheric stability of any layer of air is determined by

a. both "b" and "d" must be known.

b. temperature and change of temperature with height.

c. the average sea level pressure of that layer.

d. relative humidity or other moisture measurement through the layer.

33. The best proof that a layer of unsaturated air is unstable is that

a. cumulus clouds are present.

b. the air layer has a lapse rate less than the dry adiabatic rate.

c. smoke from a chimney goes straight up.

d. the layer of air has a lapse rate greater than the dry adiabatic.

34. List the information needed before an adiabatic chart can be plotted.

a. Wind direction and speed, and relative humidity at various levels through the atmosphere, beginning at the surface.

b. Levels of changing stability.

c. Temperature, dewpoint temperature and the pressure (or height) at significant levels through the atmosphere beginning at the surface.

d. Both "a" and "c" are essential for plotting.

35. A layer of air with a lapse rate between the dry- and moist-adiabatic rates is conditionally unstable. It would be

a. neither "c" nor "d" are true.

b. unstable at all times.

c. stable under saturated conditions and unstable under unsaturated conditions.

d. stable under unsaturated conditions and unstable under saturated conditions.

36. Explain how it would be possible for a large wildfire to cause showers.

a. Heating from the fire could increase instability and convective motion. If the unstable layer is deep enough so that rising parcels ascend above the condensation level, and if the layer above the condensation level is conditionally unstable, clouds may form and produce showers.

b. This would be impossible. If showers do occur, it is only a coincidence.

c. This would happen only if there were a great amount of convection.

d. This would be possible only if the fire were exceptionally hot.

37. Orographic and frontal lifting both are important meteorological processes. How do these two processes differ?

a. They affect stability differently in the lifting process.

b. Orographic lifting is the flow around a low pressure area, whereas frontal lifting is the flow around a high pressure area.

c. Orographic lifting is more common than frontal lifting.

d. Orographic lifting is the forced ascent as air flows across mountain ranges, while frontal lifting is a forced ascent of warmer, less dense air over colder air along a frontal surface.

38. Explain why the lower atmosphere over land surfaces on a typical fair-weather day typically goes through a cycle of stability at night and unstability during the day.

a. Winds usually decrease at night. This helps to decrease mixing and, therefore, increases stability.

b. It does not; the reverse is true.

c. There usually is a shallow inversion at night and a super-adiabatic layer during the day.

d. Radiation cooling at night cools the surface and the air adjacent to it, whereas after sunrise, the earth's surface is heated and it in turn warms the air next to the surface.

39. In mountainous terrain, what are some important influences on heating and stability?

a. The annual mean surface temperature and humidity of the terrain.

b. The orientation, inclination and shape of the topography.

c. The type and distribution of ground cover and soil characteristics.

d. Both "b" and "c" are correct.

40. If subsiding air from a warm High aloft reaches the surface, which of the following would be the <u>most</u> significant change affecting fire weather?

a. Relative humidity would decrease to very low readings.

b. The air would be clear and cloudless.

c. There would be a sudden decrease in temperature.

d. There would be warming.

41. What would happen to a large layer of stable air that was, by some process, suddenly lifted or lowered in the atmosphere?

a. It would become more stable if lifted, and less stable if lowered.

b. It would become less stable if lifted, and more stable if lowered.

c. The lifted layer would expand, and the lowered layer would compress, but this would not affect the layer's stability.

d. The layer would become less stable in both cases because of the additional air movement.

42. Explain why foehn-type winds produce the most critical fire weather known.

a. Because the air is very dry, there is an increase in temperature, and the winds are very strong.

b. Because a great amount of instability is associated with this condition.

c. Because there is a sudden increase in temperature, increased wind speed, and a great amount of convective mixing.

d. The foehn-type winds do not produce the most critical fire weather--the heat wave creates a more hazardous condition than do foehn winds.

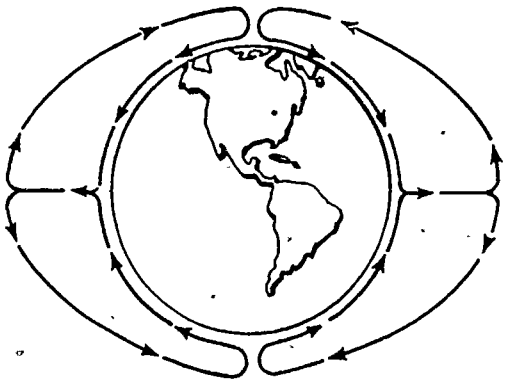
43. Good visual indicators of a stable atmosphere include:

a. stratus-type clouds, dust whirls and steady winds.

b. cumulus-type clouds, fog layers and poor visibility.

c. cumulus-type clouds, gusty winds and good visibility.

d. stratus-type clouds, fog layers and poor visibility.



CHAPTER 5. GENERAL CIRCULATION

44. The polar front zone is

a. an area between the prevailing westerlies and polar easterlies having much storminess, cloudiness, and precipitation, and its position is extremely variable.

b. a zone of storminess, cloudiness, and precipitation usually located between the belt of westerlies and the northeast trade winds.

c. a zone of cold, clear weather which varies in location.

d. a zone of cold, clear weather located at 60° north latitude.

45. How do constant-pressure charts differ from constant-level charts?

a. There is no significant difference, as both charts indicate pressure and show position of Highs and Lows.

b. The constant-level chart gives the weather pattern at sea level, whereas the constant-pressure chart gives the weather pattern for the upper-air levels.

c. Constant-pressure charts have lines of equal pressure, whereas constant-level charts have lines of equal height at a certain pressure.

d. Constant-pressure charts have lines of equal height at a constant pressure, whereas constant-level charts have lines of equal pressure at a constant level.

46. What is a low-pressure center?

a. An anticyclone.

b. An area that has a lower pressure than the surrounding region; air flows around it in a counterclockwise direction in the northern hemisphere.

c. An area that has a lower pressure than the surrounding region; air flows around it in a clockwise direction in the northern hemisphere.

d. An area that has a lower pressure than the surrounding region; it usually is characterized by good weather.

47. What are isobars?

a. Lines of equal pressure.

b. Lines showing positions of surface Highs and Lows.

c. Contours of equal height on upper-air constant-pressure charts.

d. Lines on a surface weather map which indicate the direction of the wind.

48. How does the airflow change when pressure gradient increases?

a. The direction of airflow becomes more cyclonic.

b. The speed of the airflow decreases.

c. The direction of the airflow becomes more anticyclonic.

d. The speed of the airflow increases.

49. Why is the 2,000-foot level above the surface significant to meteorologists?

a. At this level, airflow normally will increase in speed and vary more in direction.

b. At this approximate level, surface friction normally loses its influence so that free airflow is more nearly parallel to the isobars.

c. At this approximate level, most of the clouds begin to form.

d. At this level, the effects of surface friction are at a minimum, allowing the wind to decrease significantly in speed.

50. How is the seasonal position of the jet stream related to seasonal weather in the contiguous United States?

a. Warmer weather will occur in the winter if the jet stream remains far to the north over Canada, but the jet stream position does not affect summer weather in the United States.

b. Warmer weather usually will occur in all seasons if the jet stream moves far to the south, and cooler weather will occur when the jet streams remains to the north over Canada.

c. Warmer weather usually will occur in all seasons if the jet stream remains far to the north over Canada, and cooler weather will occur when it moves far to the south.

d. Warmer weather will occur in the summer if the jet stream remains far to the north over Canada, but the position of the jet stream does not affect winter weather in the United States.

51. Many semipermanent surface Highs and Lows have been named because of their persistent seasonal location in the northern hemisphere. In general, where do these semipermanent systems develop?

a. Semipermanent Highs develop over large areas which are warmer than their surroundings, whereas semipermanent Lows develop over areas that are cooler than their surroundings.

b. Semipermanent Highs generally develop over water and semipermanent Lows develop over land.

c. Semipermanent Highs develop over large areas that are cooler than their surroundings, whereas semipermanent Lows develop over areas that are warmer than their surroundings.

d. Semipermanent Highs develop over land and semipermanent Lows develop over water.

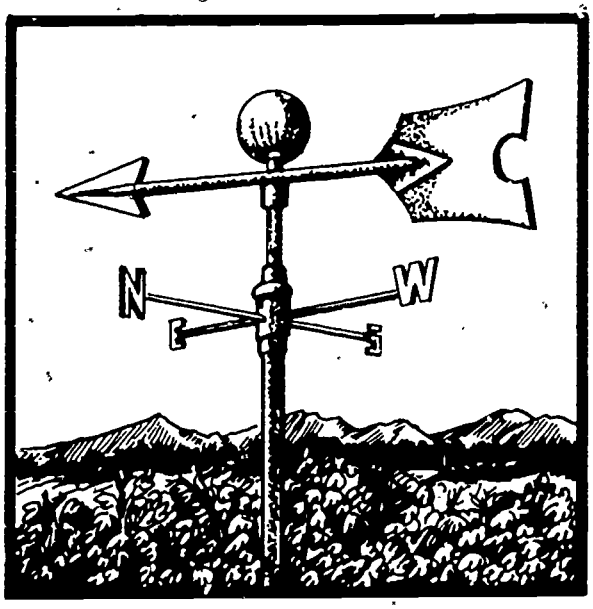
52. Why would a forecaster expect a hurricane to lose its intensity as it moves inland from the ocean?

a. Because the friction of the rougher land surface causes a decrease in wind speed.

b. Both "a" and "c" are correct.

c. Because it loses its moisture supply over land.

d. A hurricane would not necessarily decrease in intensity as it moves inland. In fact, it is not uncommon for a hurricane to have increased intensity as it strikes inland cities.



CHAPTER 6. GENERAL WINDS

53. A wind of 22 1/2 degrees is one

a. blowing from the northeast.

b. blowing from the north-northeast.

c. blowing to the northeast.

d. blowing to the north-northeast.

54. What is the advantage of using the terms "upslope" and "downslope" to describe winds in mountainous topography rather than the standard compass direction?

a. Knowing the vertical component of a wind will let the firefighter know how fire behavior will be influenced.

b. Only these terms give the firefighter a clue to how dry the air is.

c. These terms should not be used. They are too vague to most experienced firefighters.

d. These terms relate the airflow to the topography, and thus provide the firefighter a clear picture of airflow in rugged terrain.

55. Because it is the result of surface heating, thermal turbulence

a. rarely occurs when the air is unstable.

b. Both "c" and "d" are correct.

c. is generally most pronounced in the early afternoon.

d. is generally more pronounced in the lower layers of the troposphere than in higher layers.

56. What is the main reason why the wind does not always blow parallel to the isobars on the surface weather map?

a. Surface heating and cooling causes fluctuation of wind direction under 2,000 feet.

b. Vegetation affects airflow.

c. Friction caused by the roughness of the earth's surface affects airflow.

d. We are in the "belt of westerlies".

57. What determines the size, shape and motion of an eddy near the ground?

a. The temperature of the air near the earth's surface in relation to the speed of the wind.

b. The location of the jet stream with respect to the location of the eddy.

c. The size and shape of an object in the wind path, the speed and direction of the wind, and the stability of the lower atmosphere.

d. The amount of gustiness of the wind.

58. What is laminar flow and how would it influence wildland fire behavior?

a. It is a downslope flow in a single direction, and, because of this, a wildfire would spread in one direction only.

b. It is a flow without a vertical component and a wildfire would burn in a single direction with the flow.

c. It is a flow in which the air moves smoothly in parallel layers or sheets; because it is a nonturbulent flow, it would favor evenly-spreading fire in a single direction.

d. It is a flow in which there are both vertical and horizontal eddies, and a wildland fire would burn erratically.

59. What is vertical "wind shear"?

a. The constant wind speed and direction with change in latitude.

b. The change of wind speed or wind direction with height.

c. The main characteristic of a foehn wind.

d. Both "b" and "c" are correct.

60. Which weather changes normally are characteristic of a cold frontal passage?

a. Both "b" and "d".

b. Clearing and improvement of the weather and a temperature decrease.

c. An increase in relative humidity and in cloud cover.

d. A well-defined barometric trough and a pronounced wind shift.

61. Why are squall lines, which are known for their heavy precipitation, unwelcome to firefighters?

a. The lightning from thunderstorms scattered along the squall line may start fires.

b. The heavy rain from the squall helps support more plant-life, which eventually dies and is a fire hazard.

c. Quick drying occurs after the squalls.

d. A local area might experience squall-line winds up to 60 miles per hour, without getting the benefits of the rain.

62. What is necessary for the formation of mountain waves?

a. In a stably stratified atmosphere, there must be moderate to strong winds blowing nearly perpendicular to a high mountain range.

b. There must be a squall line over the mountain range.

c. There must be a deep low-pressure system over the mountain range.

d. In an unstable atmosphere, there must be moderate to strong winds blowing parallel to a high mountain range.

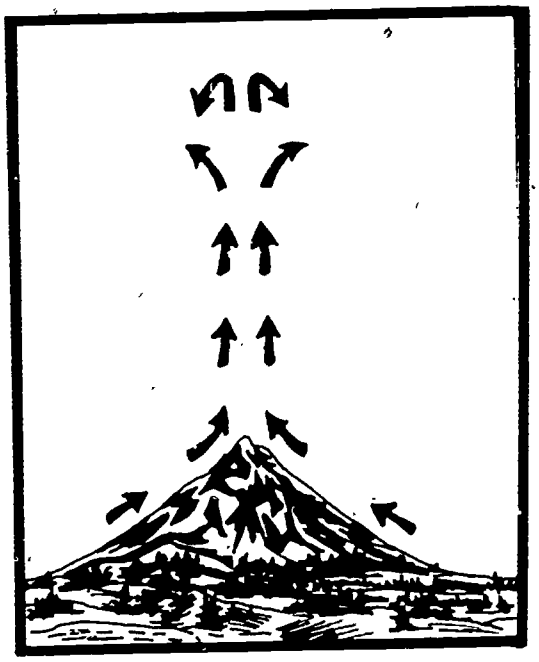
63. What is the relation of the wind to the surface pressure pattern when foehn winds occur?

a. Air flows from a high-pressure area on the windward side of the mountains to a low-pressure trough or area on the leeward side.

b. Air flows from a high-pressure area on the windward side of the mountains to another high-pressure area on the leeward side.

c. Air flows from a low-pressure area on the windward side of the mountains to a high-pressure area on the leeward side.

d. Air flows from a low-pressure area on the windward side of the mountains to another low-pressure trough on the leeward side.



CHAPTER 7. CONVECTIVE WINDS

64. Which of the following is the most direct cause of convective winds?

a. Local differences in terrain.

b. Local temperature differences.

c. Local differences in vegetation.

d. Temperature inversions.

65. What is meant by land and sea breezes and when would they usually occur?

a. A sea breeze is a wind that blows from over land to the water and begins 2 to 3 hours after sunset and ends shortly after sunrise, whereas a land breeze is a wind that blows from over water to land and begins about midforenoon and ends around sunset.

b. A sea breeze is a wind that blows from over water to the land and begins 2 to 3 hours after sunset and ends shortly after sunrise, whereas a land breeze is a wind that blows from land to water and begins about midforenoon and ends around sunset.

c. A sea breeze is a wind that blows from over land to the water and begins about midforenoon and ends around sunset, whereas a land breeze is a wind that blows from water over land and begins 2 to 3 hours after sunset and ends shortly after sunrise.

d. A sea breeze is a wind that blows from over the water to the land and begins about midforenoon and ends around sunset, whereas a land breeze is a wind that blows from land to over the water and begins 2 to 3 hours after sunset and ends shortly after sunrise.

66. Which of the following could mask or alter the normal diurnal flow of land and sea breezes?

a. General winds.

b. Both "a" and "c".

c. Frontal passages.

d. Transpiration.

67. In what seasons are the Gulf and Atlantic and the Pacific sea breezes most pronounced?

a. The Gulf and Atlantic sea breezes are most pronounced in summer, and the Pacific sea breeze is most pronounced in late spring and early summer.

b. All are most pronounced in winter when more storms occur.

c. All are most pronounced during early summer.

d. The Gulf and Atlantic sea breezes are most pronounced in late spring and early summer, and the Pacific sea breeze is most pronounced in summer.

68. Why are sea breezes generally stronger along the Pacific Coast than the eastern coasts?

a. The opposite is true. Sea breezes are stronger on the eastern coasts.

b. Because the greater temperature differences between the land and sea along the Pacific Coast cause a stronger flow.

c. Both "b" and "d" are correct.

d. Because the general winds tend to strengthen the Pacific Coast sea breeze while they tend to oppose the east coast sea breeze.

69. Winds in mountainous terrain often are very complex. Which of the following best describes "upslope" and "downslope" winds (exclusive of other influences such as a strong general wind)?

a. Diurnal winds caused by surface heating and cooling. They flow in a shallow layer along the slopes, downslope at night and upslope during the day.

b. Winds caused by a strong, large-scale pressure gradient. They flow in a deep layer in mountainous terrain, downslope during the day and upslope at night.

c. Diurnal winds caused by surface heating and cooling. They flow in a shallow layer along the slopes, downslope during the day and upslope at night.

d. Winds caused by a strong, large-scale pressure gradient. They flow in a deep layer in mountainous terrain, downslope at night and upslope during the day.

70. How do upvalley winds affect upslope winds as the valley wind system strengthens during the day?

a. The upslope winds are changed to a more upvalley direction.

b. The upslope winds always dominate the upvalley winds completely.

c. The combination of the two influences tends to lower wind speeds of both upvalley and upslope winds.

d. Upvalley winds do not normally affect upslope winds.

71. What conditions of stability, fuels and/or terrain best favor firewhirls?

a. Very unstable air in a fire burning in heavy concentrations of fuel on the lee side of a ridge, where there is little influence on the fire from the general winds.

b. Flat terrain where the wind is very strong.

c. Flat terrain where the air is very unstable.

d. Stable conditions where the fire is burning in a valley that is parallel to the general wind flow, and there is only spotty fuel.

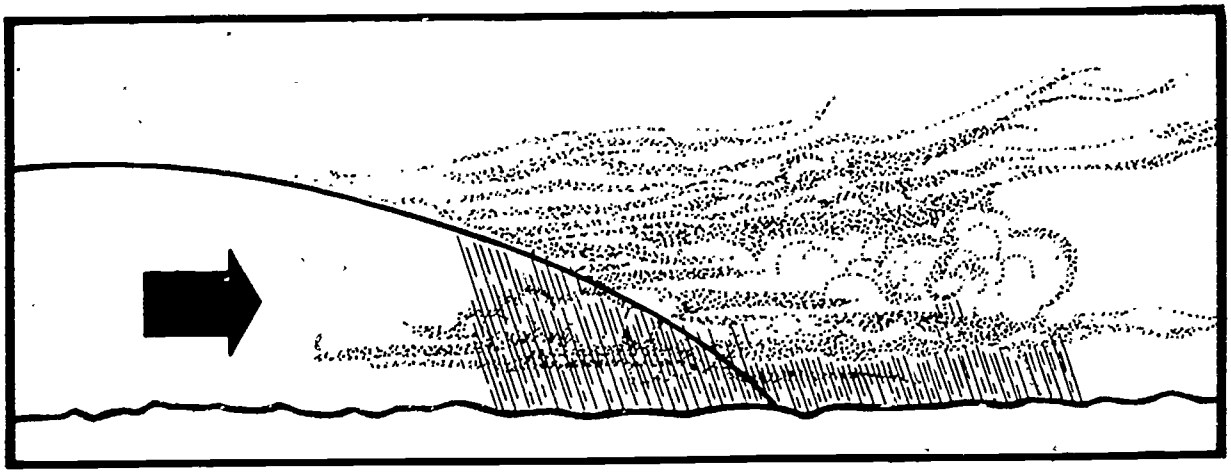
72. What are the characteristics of winds associated with thunderstorms?

a. Updrafts predominate while the cloud is forming. Downdrafts occur in later stages of development and dissipation. These downdrafts produce local winds from 20 to 75 miles per hour in the vicinity of the thunderstorm, and they usually are short-lived.

b. Downdrafts predominate in and beneath the growing cumulus cloud. In later stages of thunderstorm development, updrafts occur producing surface winds up to 75 miles per hour in the immediate area of the thunderstorm.

c. Winds in and around a thunderstorm always are gusty and erratic so any other generalizations would be misleading.

d. Winds in and around a thunderstorm usually are masked either by the general wind or diurnal winds, so one would need to know the direction of these winds before the winds of a thunderstorm could be explained.



CHAPTER 8. AIR MASSES AND FRONTS

73. Describe a maritime tropical air mass in its source region.

a. It is warm, dry and usually stable.

b. It is warm, has a high moisture content and is conditionally unstable.

c. It is cool, dry, and usually very stable.

d. It is cold, has a high moisture content, and is conditionally unstable.

74. How does the atmosphere along the leading edge of a cPk-type air mass change as it moves southward over land?

a. The atmosphere will become unstable in the lower layers.

b. Moisture will be removed from the air by condensation or precipitation.

c. The leading edge of the air mass will lose its characteristics and take on the characteristics of an mT air mass.

d. The atmosphere will become stable in the lower layers.

75. Which of the air masses either are directly or indirectly responsible for most of the hazardous fire weather in southern and southeastern United States during the cool months?

a. mT

b. mP

c. cP

d. cT

76. What change does a cP air mass undergo in the summer as it moves southward out of its source region?

a. It is warmed from below and becomes more stable.

b. It undergoes little or no change.

c. It becomes much drier.

d. It is warmed from below and becomes more unstable.

77. How does maritime tropical air from the Gulf of Mexico normally affect weather in central United States in the winter?

a. There are thunderstorms and cumulus clouds, the lower layer of the atmosphere is unstable, and the temperatures and humidities remain relatively the same or become slightly cooler and lower.

b. There are rain or drizzle and stratus and stratocumulus clouds, the lower layers of the atmosphere are stable, and the temperatures and humidities are high.

c. There are rain or drizzle and stratus and stratocumulus clouds, the lower atmosphere is stable, and the temperatures and humidities are the same or become slightly cooler and lower.

d. There are thunderstorms and cumulus clouds, the lower atmosphere is unstable, and the temperatures and humidities are high.

78. For pinpointing a surface cold front on a surface weather map, data should be examined for the following:

a. wind shift line, temperature discontinuity and pressure trough line.

b. moisture discontinuity, cloud types, pressure change and visibility.

c. differing air mass characteristics in the central portions of all air masses associated with areas of high pressure.

d. Both "a" and "b".

79. How are warm and cold fronts distinguished on a weather map?

a. A cold front is indicated by pointed cusps, and a warm front by alternate barbs and semicircles.

b. A cold front is indicated by semicircles, and a warm front by pointed cusps.

c. A cold front is indicated by pointed cusps, and a warm front by semicircles.

d. A cold front is indicated by alternate barbs and semicircles, and a warm front by semicircles.

80. What usually happens to the barometric pressure as a cold front approaches and passes a station?

a. Pressure falls sharply as the front approaches, continues to fall sharply at the time of the frontal passage, then rises gradually after the frontal passage.

b. Pressure usually rises slightly before a frontal passage, decreases slightly at the time of frontal passage, and then rises sharply after the frontal passage.

c. Pressure is steady, except for diurnal variations, before a frontal passage and then drops sharply when the front passes.

d. Pressure usually falls gradually as the front approaches, reaches its lowest point as the front passes, and then rises sharply.

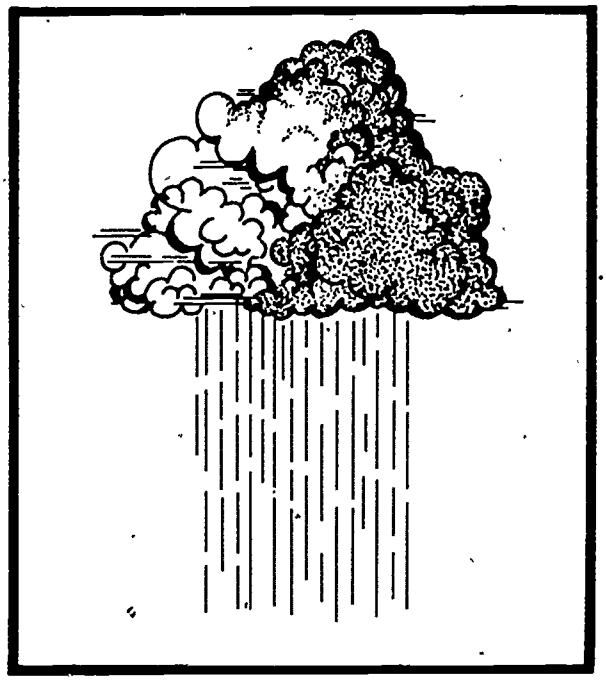
81. What kind of weather is associated with a warm front?

a. It is very severe in a narrow band, sometimes only a few miles wide. Scattered showers and thunderstorms always occur ahead of the front, but there never is any precipitation behind it.

b. Cloudiness and precipitation extend over a broad area ahead of the front if there is sufficient moisture in the warm air. After the frontal passage, temperatures rise, precipitation stops or decreases, and clouds diminish.

c. There are cloud types of cirrus, cirrostratus, altostratus, and nimbostratus in sequence, but no precipitation.

d. There are cloud types of altocumulus and cumulonimbus; thunderstorms will occur.



CHAPTER 9. CLOUDS AND PRECIPITATION

82. Adiabatic cooling of the air occurs when

a. air rises as the result of strong surface heating. This is called thermal lifting.

b. air is forced up the windward side of slopes, hills or mountains. This is called orographic lifting.

c. air is forced downslope by strong winds.

d. either process "a" or "b" occurs. Frontal lifting also is a common cause of adiabatic cooling.

83. In order for clouds to form, the atmosphere must become saturated with moisture. What are the two principal ways this saturation point is reached in the atmosphere?

a. By the addition of moisture to the air and by lowering of the air temperature.

b. By rain from above and by evaporation from the oceans.

c. By thermal lifting of the air and by movement of air over a very cold surface.

d. By the processes of condensation and sublimation.

84. Which of the following could be the best estimate for the height of the base of a cumulus cloud on a warm summer day given the following information: surface temperature, 85° F., wet-bulb temperature, 67° F.; dewpoint temperature, 57° F.; and the relative humidity, 39 per cent?

a. 7,000 ft.

b. 5,000 ft.

c. 6,000 ft.

d. 10,000 ft.

85. Why are low-pressure areas usually areas of cloudiness and precipitation?

a. Usually there is a cold front associated with the Low, which produces the clouds and precipitation if sufficient moisture is present.

b. The low-pressure areas usually are formed in a cP type air mass, where they pick up the cold air which produces the cloudiness and precipitation.

c. Circulation around a low-pressure area causes horizontal converging of air at low levels and lifting of air near the center. This lifting produces clouds and precipitation if sufficient moisture is present.

d. The air around a low-pressure system generally is very unstable, and clouds will form and produce precipitation if there is sufficient moisture present.

86. Clouds are classified into two main subdivisions, cumuliform and stratiform. Distinguish between them.

a. Cumuliform clouds are formed by localized vertical currents and are billowy in appearance, whereas stratiform clouds are formed by lifting of the entire layer of air and always are spread out in layers.

b. Cumuliform clouds are formed by lifting of entire layers of air and always are spread out in layers, whereas stratiform clouds are formed by localized vertical currents and are billowy in appearance.

c. Cumuliform clouds always are high clouds, whereas stratiform clouds usually are low clouds.

d. Cumuliform clouds are in layers and indicate stable air, whereas stratiform clouds are billowy in appearance and indicate unstable air.

87. Describe cirrostratus clouds and state what their appearance might indicate.

a. They are of the middle type; they appear as a grayish or bluish layer not covering the entire sky, and indicate an approaching cold front.

b. They form a thin, whitish, transparent cloud layer appearing as a sheet or veil and at times totally covering the sky; they may indicate an approaching warm front.

c. They appear as small, white individual puffs, and may contain some supercooled water droplets mixed with ice crystals. They may indicate an approaching warm front.

d. They form a thin, whitish and transparent layer appearing as a sheet or veil, at times totally covering the sky. They may indicate an approaching cold front.

88. What do lenticular clouds indicate?

a. Turbulence.

b. Mountain waves.

c. Thick ground fog.

d. Thunderstorms.

89. What type of fog would be most likely to occur when warm, moist air passes over a cool surface?

a. Upslope.

b. Radiation.

c. Advection.

d. Frontal.

90. How can one best determine the difference between drizzle and "very light" rain (R--)?

a. In drizzle, droplets are larger and less numerous than in R--. Stratus clouds, fog and low visibilities are associated with R--.

b. In drizzle, droplets are smaller and more numerous than in R--, but visibilities are higher in drizzle.

c. In drizzle, droplets are larger than in very light rain; drizzle is accompanied by stratus clouds and/or fog.

d. In drizzle, droplets are smaller and more numerous than in very light rain. Drizzle is accompanied by stratus clouds and fog, and it reduces visibility much more than does very light rain.

91. What is the difference between sleet and freezing rain and drizzle?

a. Freezing rain and drizzle fall as a liquid and freeze only after striking the ground. Sleet is formed by the freezing of liquid rain as it falls through below-freezing air.

b. Freezing rain and drizzle consist of crystals of ice formed by the freezing of raindrops or refreezing of partly melted snowflakes as they fall through a below-freezing layer of air.

c. Freezing rain and drizzle consist of crystals of ice formed in pure ice clouds, whereas sleet is formed when ice crystals coalesce with supercooled droplets.

d. Freezing rain and drizzle fall as a liquid and freeze only after striking the ground, whereas sleet consists of balls of ice ranging in size from one-fifth to several inches in diameter and are formed in a cloud, by turbulence.

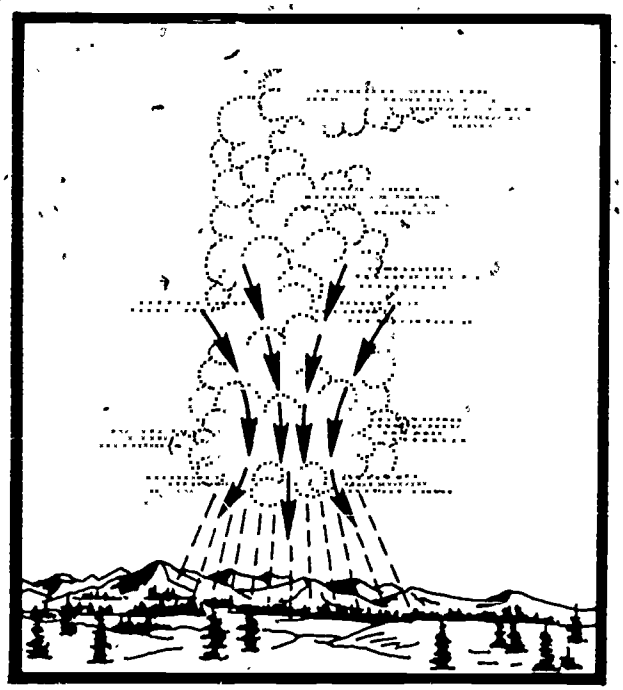
92. Cumulonimbus clouds characteristically are

a. in the form of a gray layer with a rather uniform base. Usually they do not produce precipitation, but when it does occur, it is in the form of minute particles such as drizzle.

b. very dense with considerable vertical development and usually an anvil-shaped top. They frequently are accompanied by thunder, lightning and rain or snow showers.

c. in the form of a gray layer with a rather uniform base. They frequently are accompanied by thunder, lightning and rain or snow showers.

d. very dense with considerable vertical development and usually an anvil-shaped top. Usually they do not produce precipitation, but when it does occur, it is in the form of minute particles such as drizzle.



CHAPTER 10. THUNDERSTORMS

93. How large are thunderstorms?

a. They range from a few square miles in area to 10 miles in diameter, but a cluster of cells with inter-connecting cloud masses may extend for 50 miles.

b. They range from 1/4 to 1 mile in diameter. Sometimes, however, they seem larger, but this is because they themselves move to cover a large surface area.

c. They range from a few feet up to 10 miles in diameter.

d. The largest thunderstorm has reached 50 miles in diameter, and the smallest generally are no less than 10 square miles.

94. What conditions are necessary for the development of a thunderstorm?

a. There must be conditionally unstable air, sufficient moisture and some triggering mechanism to release the instability.

b. The air must be unstable and there must be sufficient moisture for cloud formation.

c. There must be fairly stable air and it must be of the cP type.

d. There must be either orographic lifting or frontal lifting.

95. In which of the following states do the largest number of lightning fires generally occur?

a. Georgia and Florida.

b. Arizona and New Mexico.

c. Washington and Oregon.

d. Arizona and California.

96. If a thunderstorm in its cumulus or initial stage passes over a wildfire, what is the probable effect on fire behavior?

a. Slight cooling takes place because the cloud shades the sun. Fuel temperatures, therefore, lower slightly, and this decreases the fire's activity.

b. The effects vary. If precipitation occurs, it aids the firefighter; however, if not, the turbulent air creates further problems for the firefighter.

c. The updraft of air into the cloud and the convection column over the fire reinforce each other, causing a stronger updraft and an increase in fire activity. Fire spotting usually is increased, also.

d. Firewhirls occur.

97. How does a mature, wet air-mass thunderstorm affect the weather in an area?

a. As it strikes an area, it causes a sharp change in wind direction and an increase in wind speed. There is a sudden temperature drop and heavy rain and strong gusty winds at ground level.

b. Both "a" and "d" are correct.

c. Drizzle falls from the cloud. The downdraft is weak and temperatures rise.

d. There is extreme turbulence in and below the cloud and lightning frequency is at its maximum.

98. What would be the result of entrainment of very dry air during the cumulus stage of thunderstorm development?

a. Updrafts into the cloud might cease and the cumulus cloud might not continue development or might even dissipate.

b. Updrafts would decrease and change to downdrafts.

c. The thunderstorm would not be as intense as it would be if entrainment were moist, warm air.

d. The thunderstorm would develop more rapidly and the storm would produce more lightning.

99. When is lightning more frequent?

a. At the time when a thunderstorm has reached its maximum height.

b. Both "a" and "d" are correct.

c. At the dissipating stage of a thunderstorm right after the rain ends.

d. During the mature stage of a thunderstorm right after the rain begins.

100. Why are some thunderstorms "dry"?

a. Because they have rained themselves out and are in the dissipating stage by the time they reach the area.

b. Because their cloud bases are so high (often above 15,000 feet) that precipitation evaporates before it reaches the ground.

c. Because they usually are the type which develop in the arid Southwest.

d. Because the atmosphere contains insufficient moisture for the storm to develop.

101. The life cycle of a <u>single</u> thunderstorm cell may last up to 1 1/2 hours. However,

a. neither "b" nor "D" is correct.

b. a cluster of thunderstorm cells may persist for 6 hours or more.

c. both "b" and "d" are correct.

d. individual cells may have many variations in growth, behavior, movement and amount of rainfall.

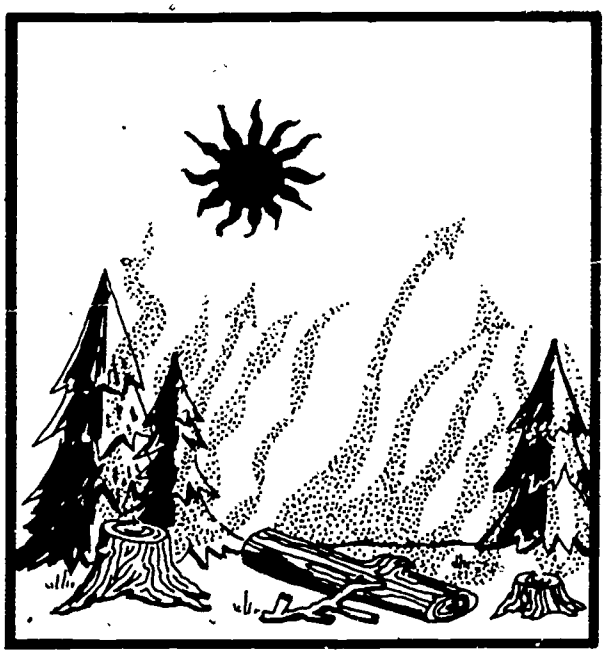
102. Why are thunderstorms important in fire control?

a. Fires may be started by lightning, or fires may be blown out of control by strong downdrafts produced by the thunderstorms.

b. Both "a" and "c" are correct.

c. Thunderstorms may produce enough rain to put out going fires.

d. They are not important. Fire control people are not concerned with thunderstorms, mainly because they feel that their occurrence is an "Act of God."



CHAPTER 11. WEATHER AND FUEL MOISTURE

103. How is fuel moisture commonly expressed?

a. As a percent of ovendry weight, obtained by dividing the weight of the contained water by the ovendry weight of the fuel, and converting to percent.

b. As percent of total fuel weight, computed by dividing the weight of the fuel before ovendried by its weight after ovendried.

c. As percent of ovendry weight, computed by dividing the weight of the fuel by the amount of rainfall in the last 24 hours.

d. As proportion of total fuel weight; that is, the ratio of the weight of the contained water to the total fuel weight.

104. When is plant foliage at its peak moisture content? When is it at its lowest?

a. Highest at the time of emergence of new foliage, and lowest at death, or dormancy in the fall.

b. Highest at the time of maximum foliage, and lowest at death or dormancy.

c. Highest at the time of maximum foliage, and lowest at the time of budding or emergence.

d. Highest at the time of emergence of new foliage, and lowest at the time of maximum foliage.

105. When and where is the lowest fuel moisture normally found?

a. In the morning on southwest slopes.

b. In the afternoon on north slopes.

c. In the afternoon on southwest slopes.

d. In the morning on north slopes.

106. Which of the following are most sensitive to short-term surface soil moisture and weather changes?

a. Deciduous forests.

b. Annual range grasses.

c. Perennial grasses.

d. Evergreens.

107. Except for extreme wind conditions, why are ground fires in a deciduous forest in full leaf rarely a serious threat?

a. The foliage reduces solar radiation, which helps maintain temperature-humidity relationships favoring high moisture content below the forest canopy.

b. Deciduous forests normally are found in areas that receive ample precipitation to keep fuel moisture high.

c. Fuels on the ground tend to become highly compacted under a deciduous stand.

d. So much transpiration takes place in and around a deciduous forest that temperatures remain fairly cool most of the time.

108. A good example of the use of equilibrium moisture content would be

a. to estimate, using relative humidity, the moisture content of heavy fuels such as large logs.

b. to estimate the amount of precipitation that has occurred.

c. to estimate how much additional moisture living plants require in order to reach maximum moisture.

d. to estimate, using relative humidity, the moisture content of fine fuels.

109. Why can moisture content vary over a greater range in dead fuels than in the same kinds of live fuels?

a. Dead fuels can reach a much lower moisture content; therefore, they have a larger range in which to vary. (If moisture content of live fuels decreases beyond some minimum value, the plant dies and it becomes dead fuel.)

b. Dead fuels are hygroscopic.

c. Dead fuels have no "timelag".

d. Dead fuels extract water vapor from the atmosphere.

110. What is timelag, as it applies to wildland fuels, and how does it vary?

a. Under defined, standard conditions, timelag is the time curve of fuel-moisture response, and it is the same for all types of fuels but varies according to the fuel size.

b. Timelag is the time it takes fuel to reach 80° F. and 20 percent relative humidity; it varies from 1 to 100 days, depending on the fuel.

c. Timelag is the time it takes fuel to reach 80° F. and 20 percent relative humidity; it varies from a few minutes in fine fuels to periods of over a month in larger fuels.

d. Timelag indicates fuel-moisture response versus time relationship (under conditions of 80° F. and 20 percent relative humidity) for adsorption and drying of dead fuels; it varies from a few minutes in fine fuels to periods over a month in larger fuels.

111. Why do ground fuels have more complex moisture changes than aerial fuels?

a. This is not correct. The opposite is true.

b. Ground fuels generally are made up of many kinds of dead plants.

c. They become compacted into a fuel bed. Moisture gradients develop between the fuel and the soil, the fuels and the air, and between the top and bottom of the fuel bed itself, whereas aerial fuels exchange moisture only with the surrounding air.

d. There is no air circulation in the lower layer of ground fuels.

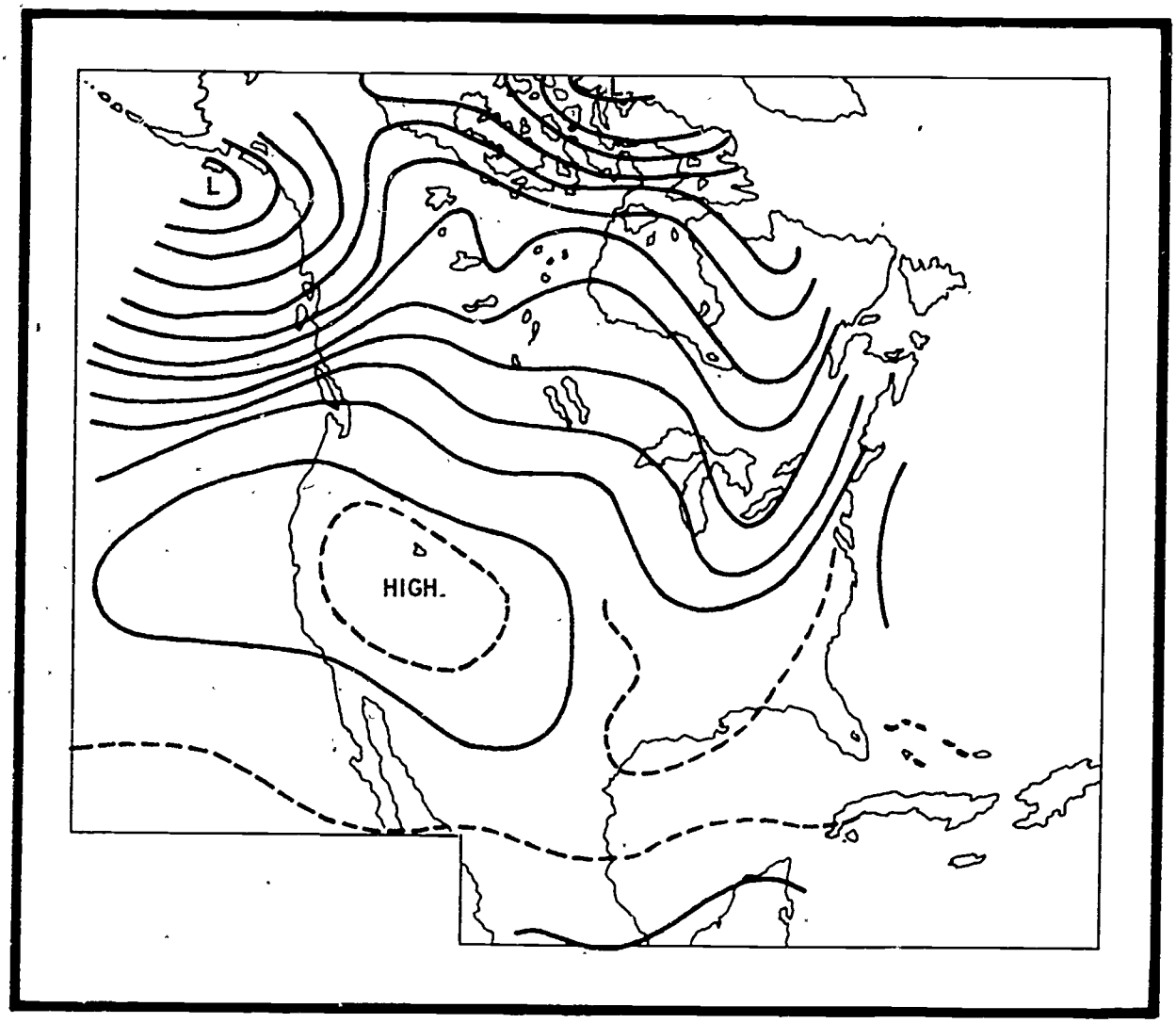
112. For estimating the moisture content of larger fuels, the following must be considered:

a. The length of the growing season.

b. The variations in atmospheric stability.

c. The amounts and duration of precipitation, the number of days without precipitation and the daily drying conditions.

d. All of the above.



CHAPTER 12. FIRE CLIMATE REGIONS

113. Fire climate is

a. the best means of determining fire potential.

b. the average daily temperature of a region.

c. the composite or integration over a period of time of the weather elements that affect fire behavior of a region.

d. the determining factor of what day-to-day weather will be in any particular area.

114. Because of the influence of the oceans,

a. mean temperatures will be lower along the coast than in the interior in winter. In the summer, temperatures will be higher along the coast and lower in the interior.

b. mean temperatures will be higher along the coast than in the interior in winter. In the summer, temperatures will be lower along the coast and higher in the interior.

c. mean temperatures will be higher along the coast than in the interior in the winter, but in summer the oceans lose their influence over inland areas because of the heating over land.

d. temperatures will be higher along the coast and lower in the interior in the summer, but, in the winter, the oceans lose their influence over inland areas because they are so cold.

115. In winter, why is the mean temperature higher along the west coast than the east coast?

a. Both "c" and "d" are true.

b. The west coast generally is at higher elevations than the east coast.

c. Because the general flow is west-to-east, the west coast is more strongly influenced by the adjacent ocean than the east coast. In the winter, this warmer-than-land marine influence moderates temperatures.

d. The west coast usually is sheltered from the cold, continental air masses by high mountain ranges.

116. What are the three major influences on temperature?

a. Latitude, humidity and atmospheric stability.

b. Wind, distribution of land and water surfaces and elevation.

c. Wind, humidity and atmospheric stability.

d. Latitude, distribution of land and water surfaces and elevation.

117. Which of the following best describes the north Pacific Coast?

a. It is a region of mostly tundra where winters are extremely cold. Annual precipitation is 10 to 15 inches, but there is very little critical fire weather.

b. It is a region of rain-forest types. Rainfall is heavy and is mostly concentrated in the winter months. Winter months are extremely cold, especially along the coastal areas, and summer months are very warm and dry.

c. It is a region of rain-forest types. Rainfall is heavy and is mostly concentrated in the winter months. Coastal areas are comparatively warm throughout the winter because of the maritime influence, and summer temperatures are mostly cool.

d. It is a region of mostly tundra. Rainfall is heavy and is mostly concentrated in the winter months. Coastal areas are comparatively warm throughout the winter because of the maritime influence, and summer temperatures are mostly cool.

118. When does the most critical fire weather usually occur in Washington, Oregon and northern California?

a. In the summer and early fall during passages of cold fronts.

b. In late summer and early fall during conditions of strong dry north to east winds.

c. In midwinter during conditions of strong, dry north to east winds.

d. In January and February when the problem of dry thunderstorms is combined with drought.

119. Four of the most important weather elements incorporated in the fire danger rating system are

a. wind speed, humidity or dewpoint, precipitation, and temperature.

b. wind speed, annual precipitation, temperature and cloud cover.

c. atmospheric stability, annual precipitation, cloud cover, and sea-level pressure.

d. atmospheric stability, precipitation, temperature, and sea-level pressure.

120. The most critical fire weather in the southern Rocky Mountains is in the spring and fall on the eastern slopes of the mountains and is caused by

a. thunderstorms.

b. warm fronts.

c. chinook winds.

d. Santa Ana winds.

REFERRAL

SECTION H

Circle the numbers of your H answers. This is for your own convenience so that you can see which answers you missed.

H-1 Incorrect. Read page 2.

H-2 Incorrect. Read page 2.

H-3 Incorrect. It is not variable pressure. Pressure varies from day to day at sea level, but standard pressure remains constant at 1013.25 millibars, not 1130.25 mb. Read pages 2-4.

H-4 Incorrect. Read pages 7-8.

H-5 Incorrect. Read page 7.

H-6 Incorrect. Read pages 7-8.

H-7 Incorrect; "b" describes radiation. Read pages 8-9.

H-8 Incorrect. The opposite is true. Read page 12.

H-9 Incorrect. Read page 18.

H-10 Incorrect. Since the lapse rate is less than 5.5° F. per 1,000 ft., it would be stable, not unstable. Read page 18.

H-11 Incorrect. Because the shelter is to show representative readings of a large area, local influences should be avoided. These local variations become most important, however, when judgments must be made concerning fire behavior at a particular time and place. Read page 21.

H-12 Incorrect. Read page 22.

H-13 Incorrect. Litter is a poor reflector. Read pages 23-24.

H-14 Incorrect. Read "Effect of Wind", page 25.

H-15 Incorrect. Read pages 25-26.

H-16 Incorrect. Read "Vertical Variation of Air Temperature", page 27.

H-17 Incorrect. Read pages 27-28.

H-18 Incorrect. Read pages 28-29.

H-19 Incorrect. This area is in the thermal belt and would have warmer temperatures. Read page 29.

H-20 Incorrect. Read page 32.

H-21 Incorrect. Read page 35.

H-22 Incorrect. It is not the total atmospheric pressure, just the vapor pressure part. Read pages 35-36.

H-23 Incorrect. Read page 37.

H-24 Incorrect. Given this information, atmospheric moisture can accurately be determined. Read pages 37-41.

H-25 Incorrect. Read pages 38-39.

H-26 Incorrect. Read pages 39-41.

H-27 Incorrect. Read page 41.

H-28 Incorrect. Read page 42.

H-29 Incorrect. Read page 43.

H-30 Incorrect. Read pages 43-45.

H-31 Incorrect. Read pages 45-48.

H-32 Incorrect. Average pressure is not directly related to stability. Read page 50.

H-33 Incorrect. Read page 50.

H-34 Incorrect. Read page 51.

H-35 Incorrect. Read page 54.

H-36 Incorrect. Read page 56.

H-37 Incorrect. Air masses react the same way, regardless of whether they are lifted by the slope of the topography or by the slope of a heavier air mass. Read page 56.

H-38 Incorrect. Read page 58.

H-39 Incorrect. Average annual temperature would not be significant. Actual temperatures of the surface and layers of air above the surface are important factors in stability, however. Read pages 59-60.

H-40 Incorrect. Read pages 60-61.

H-41 Incorrect. Read pages 55-57.

H-42 Incorrect. Atmospheric instability is not characteristic of foehn wind conditions. Read pages 60-64.

H-43 Incorrect. Read pages 65-66.

H-44 Incorrect. Read pages 71-72.

H-45 Incorrect. Just the opposite is true. Read pages 73-74.

H-46 Incorrect. Read pages 74-75.

H-47 Incorrect. Read page 73.

H-48 Incorrect. Read pages 75-76.

H-49 Incorrect. Read pages 77-78 (see also page 88).

H-50 Incorrect. Read pages 79-80.

H-51 Incorrect. Read pages 80-83.

H-52 Incorrect. Read pages 83-84.

H-53 Incorrect. Read page 86.

H-54 Incorrect. Read pages 86-87.

H-55 Incorrect. Read pages 88-90.

H-56 Incorrect. Read pages 88-89.

H-57 Incorrect. Read pages 90-91.

H-58 Incorrect. Read pages 90-91.

H-59 Incorrect. Read page 92.

H-60 Incorrect. Read pages 93-96.

H-61 Incorrect. Generally, in areas subject to squalls, average precipitation is substantial, so precipitation from any one squall would not strongly affect plantlife. Read pages 95-96.

H-62 Incorrect. Read pages 99-100.

H-63 Incorrect. Read pages 100-104.

H-64 Incorrect. Read page 108.

H-65 Incorrect. Read pages 109-110.

H-66 Incorrect. Transpiration has nothing to do with sea breeze. Read pages 109-111.

H-67 Incorrect. Read pages 111-112.

H-68 Incorrect. Read pages 112-113.

H-69 Incorrect. Read pages 113-115.

H-70 Incorrect. Read pages 116-118.

H-71 Incorrect Read pages 122-124.

H-72 Incorrect. Read pages 124-125.

H-73 Incorrect. Read pages 132-134.

H-74 Incorrect. Read pages 129-130.

H-75 Incorrect. Read pages 130-136.

H-76 Incorrect. Read pages 132-133.

H-77 Incorrect. Read pages 132-135.

H-78 Incorrect. Read page 137.

H-79 Incorrect. Read page 137.

H-80 Incorrect. Read pages 138-139.

H-81 Incorrect. Read pages 139-141.

H-82 Incorrect. This results in adiabatic warming. Read pages 146-150.

H-83 Incorrect. Read page 146.

H-84 Incorrect. Read page 147.

H-85 Incorrect. A cP type of air mass generally is associated with an area of high pressure. Read pages 151 and 135.

H-86 Incorrect. Either kind can be high or low. Read page 154.

H-87 Incorrect. Read pages 156 and 140.

H-88 Incorrect. Read page 158.

H-89 Incorrect. Read page 161.

H-90 Incorrect. Read page 163.

H-91 Incorrect. Read page 163.

H-92 Incorrect. Read pages 159-163.

H-93 Incorrect. Read page 167.

H-94 Incorrect. Read pages 167-169.

H-95 The answer should be Arizona and New Mexico. Read page 168.

H-96 Incorrect. Rain does not occur at all during the cumulus stage of thunderstorm development. Read pages 171-174.

H-97 Incorrect. Read pages 173-174.

H-98 Incorrect. Read page 171.

H-99 Incorrect. Read pages 176-177.

H-100 Incorrect. The moisture must be there in order for the storm to develop and be called a thunderstorm. Read pages 167 and 177-178.

H-101 Incorrect. Read pages 171-174.

H-102 Incorrect. Read page 179.

H-103 Incorrect. Read page 181.

H-104 Incorrect. Read page 182.

H-105 Incorrect. Read page 191.

H-106 Incorrect. Read page 184.

H-107 Partly correct. Transpiration does take place, and deciduous forests do remain fairly cool; but "a" is a better answer. Read page 184.

H-108 Incorrect. This would not tell one the precipitation amount. Read pages 187-188.

H-109 Incorrect. Read pages 188-189.

H-110 Incorrect. Read pages 188-189.

H-111 Incorrect. Read page 190.

H-112 Incorrect. Read page 193.

H-113 Incorrect. Read page 197.

H-114 Incorrect. Read pages 200-201.

H-115 Incorrect. This is not the reason for higher winter temperatures. Read pages 200-201.

H-116 Incorrect. Read page 200.

H-117 Incorrect. Read page 204.

H-118 Incorrect. Read page 204.

H-119 Incorrect. Read page 197.

H-120 Incorrect. Read page 210 and pages 139-140.

SECTION E

Circle the numbers of your E answers.

E-1 Partly correct. Read page 2.

E-2 Partly correct. Read page 2.

E-3 Partly correct. Standard atmospheric pressure is an average pressure which always remains the same. Read pages 2-4.

E-4 Partly correct; 180 B.t.u. are not required because water is not heated to 212 degrees before evaporating during sublimation. Read pages 7-8.

E-5 Incorrect. Read page 7.

E-6 Partly correct. Read pages 7-8.

E-7 Incorrect. This describes sublimation. Read pages 8 and 9.

E-8 Partly correct. The desert does cool off at night, but it cools off because there is very little moisture in the desert to create a greenhouse effect. Read page 12.

E-9 Partly correct. It would be an inversion layer, but it would be stable, not turbulent. Read page 18.

E-10 Partly correct. Convection clouds are a good indication of unstable air. However, stratus-type clouds are a good indication of a stable condition. Read page 18 for a more precise way of measuring stability.

E-11 Partly correct. The air should flow freely through the shelter, but ridges or pockets should be avoided as much as possible. A ridge would be a better location than a pocket if it is the only location available. Read page 21.

E-12 Incorrect. Read page 22.

E-13 Partly correct. Both "b" and "c" cause the temperature to be higher, so "d" is a better answer. Read pages 23 and 24.

E-14 Partly correct. This is true, but the turbulent mixing also plays an important role, so "d" is a better answer. Read page 25.

E-15 Partly correct. These are the processes of cooling. Read "How Air is Cooled", page 26, to see what part the wind has in keeping nighttime temperatures warm.

E-16 Partly correct. True, but "a" also could occur, so "b" is the best answer. Read page 27.

E-17 Partly correct. This is not necessarily true, as there can be convection without a superadiabatic lapse rate. If a superadiabatic lapse rate exists, however, convective activity will be much greater. Read page 27.

E-18 Partly correct. The air would be more stable, not less, however. Read pages 28-29.

E-19 Partly correct. In a very shallow layer along the slope, temperatures would be cold, but the cold, dense air would drain away as it forms. Read page 29.

E-20 Partly correct. Read page 32.

E-21 Partly correct. Read page 35.

E-22 Partly correct. It is the "highest" at a high temperature. Read pages 35-36.

E-23 Incorrect. This is the definition for absolute humidity. Read page 37.

E-24 Partly correct. One can assume that the relative humidity is near 100 percent, but if the dewpoint temperature is known, relative humidity <u>can be</u> calculated. Read pages 37-41.

E-25 Partly correct. Read pages 38 and 39.

E-26 Partly correct. There would be more transpiration on a hot, dry day, but very little from an open field of harvested vegetation. Read pages 39 and 41.

E-27 Partly correct. But more evaporation would occur during the day than at night, because of a warmer temperature. Read page 41.

E-28 Partly correct; "a" also is true, so "c" is best answer. Read page 42.

E-29 Partly correct. The decrease in temperature would increase relative humidity, but the decrease in absolute moisture would decrease relative humidity, so one might offset the other. Read page 43.

E-30 Partly correct. If the wind came from a cool, moist source, humidity would increase. However, with a wind from a warm, dry source, the relative humidity would decrease. Read pages 43-45.

E-31 Partly correct. Relative humidity is likely to be lower at night in the forest stand. Read pages 45-48.

E-32 Partly correct, but the variation of the temperature through the layer is even more important in determining stability. Read page 50.

E-33 Partly correct. A temperature sounding would be better proof; however, smoke going straight up is a good indicator of instability. Read page 50.

E-34 Partly correct. Relative humidity is not plotted directly. Also, wind speed and direction could be plotted for particular levels, but they are not essential for an adiabatic sounding. Read page 51.

E-35 Incorrect. It would be stable under unsaturated conditions. Read page 54.

E-36 Partly correct. The chances for this occurrence would be better the hotter the fire burned, provided the conditions in "a" were met. Read page 56.

E-37 Partly correct. In some areas, such as the mountainous areas of southern California, where fronts seldom pass, this could be true. Read page 56.

E-38 Partly correct. Although the decrease in wind speeds is a factor at night, the main influence is radiation cooling. Read page 58.

E-39 Partly correct; but "b" also is a factor. Read pages 59-60.

E-40 Partly correct. This would not be as significant, however, as the relative humidity. Read pages 60-61.

E-41 Partly correct. The layer would become less stable only if lifted--more stable if lowered. Read pages 55-57.

E-42 Partly correct. Under foehn conditions, convective mixing is at a minimum although there may be considerable mechanical turbulence. Read pages 60-64.

E-43 Partly correct. Dust whirls are not. Read pages 65-66.

E-44 Partly correct. However, it is located between the westerlies and the polar easterlies. Read pages 71-72.

E-45 Partly correct. Both show Highs and Lows, but the difference is in what the isolines on each chart represent. Read pages 73-74.

E-46 Partly correct. But air movement is in a counterclockwise direction. Read pages 74-75.

E-47 Partly correct. Read pages 73 and 75-77.

E-48 Partly correct. This is not necessarily true. The direction of the airflow could change either way. Read pages 75-76.

E-49 Partly correct. Wind speed may increase when friction decreases, but the direction likely will be more steady. Read pages 77-78.

E-50 Partly correct, but the position of the jet stream affects weather of all seasons. Read pages 79-80.

E-51 Partly correct. This would be true for summer, as the water generally is cooler than the land in the summertime. Read pages 80-83.

E-52 Partly correct, but "c" also is true. Read pages 83-84.

E-53 Incorrect. Read page 86.

E-54 Incorrect. Read pages 86-87.

E-55 Partly correct; it is most pronounced closer to where the heating occurs--at the earth's surface, but "c" also is true. Read pages 88-90.

E-56 Partly correct. Plants do have an influence, but their influence is through the effect of friction so "c" is a better answer. Read pages 88-89.

E-57 Partly correct. The earth's temperature in relation to the temperature of the layer of air above (the stability), and the speed of the wind both would influence development of eddies; however, "c" is a better answer. Read pages 90-91.

E-58 Partly correct. Unless the terrain is very smooth and flat, laminar flow will have a vertical component. Read pages 90-91.

E-59 Incorrect. Read pages 92 and 63.

E-60 Partly correct; "d" also is true, so "a" is best answer. Read pages 93-96.

E-61 Incorrect. There will not necessarily be quick drying after the squalls. Read pages 95-96.

E-62 Incorrect. Read pages 99-100.

E-63 Incorrect. Air flows from the high-pressure area to the low-pressure area. Read pages 100-104.

E-64 Partly correct. Differences in vegetation cause differences in heating which contribute to the cause of the convective winds. Read page 108.

E-65 Partly correct. Time of occurrence is wrong. Read pages 109-110.

E-66 Partly correct; "a" also is true, so "b" is better answer. Read pages 109-111.

E-67 Partly correct; "d" is a better answer. Read pages 111-112.

E-68 Partly correct; "b" also is true, so "c" is best answer. Read pages 112-113.

E-69 Partly correct. Direction of flow is wrong. Read pages 113-115.

E-70 Incorrect. Read pages 116-118.

E-71 Partly correct. Firewhirls can form in fires burning on flat terrain if there is a heavy concentration of fuels, but they would be less likely with a strong general wind than if the wind were only light. Read pages 122-124.

E-72 Partly correct. Winds from a thunderstorm can be quite erratic and downdrafts cause the gustiness, but thunderstorms have either updrafts, updrafts and downdrafts, or downdrafts, depending on their stage of development. Read pages 124-125.

E-73 Partly correct. It has a high moisture content and is conditionally unstable, but it is not cold. Read pages 132-134.

E-74 Partly correct. Precipitation in such an air mass is common, especially if the air mass to the south of it is very moist, but this is not always true. Read pages 129-130.

E-75 Incorrect. Read pages 130-136.

E-76 Partly correct. It is warmed, but it becomes more unstable. Read pages 132-133.

E-77 Partly correct. Only the first part of the statement is right. Read pages 132-135.

E-78 Partly correct; "a" also is correct, so "d" is the best answer. Read pages 137-138.

E-79 Partly correct. Description of the warm front is wrong. Read page 137.

E-80 Partly correct. Pressure does rise sharply right after the frontal passage, but rest of the sentence is incorrect. Read pages 138-139.

E-81 Partly correct. If the warm air above a warm front is moist and stable, there will be clouds in that order, but precipitation will probably occur. Read pages 139-141.

E-82 Partly correct; "a" also is true, so "d" is the best answer. Read pages 146-150.

E-83 Partly correct. These both result in lowering of the air temperature, only one of the two ways; "a" is best answer. Read page 146.

E-84 Incorrect. Read page 147.

E-85 Partly correct. The air may be unstable, depending on the amount of moisture, but "c" is a better answer. Read pages 151 and 135.

E-86 Incorrect. Read page 154.

E-87 Partly correct. Their appearance more likely would indicate an approaching warm front. Read pages 156-157 and 140.

E-88 Incorrect. Read page 158.

E-89 Incorrect. Read page 161.

E-90 Partly correct. Drizzle causes lower visibilities. Read page 163.

E-91 Partly correct. The second part of the sentence describes hail. Read page 163.

E-92 Partly correct. They are not in the form of a layer, but are very dense, with considerable vertical development. Read pages 159-163.

E-93 Partly correct. Thunderstorms do move to cover a large surface area, but first sentence is incorrect. Read page 167.

E-94 Partly correct. There also must be unstable air that is very moist. Read pages 167-169.

E-95 Incorrect. See map on page 168.

E-96 Partly correct. This is true, but has very little influence; "c" is a better answer. Read pages 171-174.

E-97 Partly correct; "b" is the best answer. Read pages 173-174.

E-98 Partly correct. Updrafts would decrease all right, but downdrafts do not develop until rain begins, and this would be unlikely. Read page 171.

E-99 Partly correct; "a" also is correct, so "b" is the best answer. Read pages 176-177.

E-100 Incorrect. Read pages 177-178.

E-101 Partly correct; "d" also is correct, so "c" is the best answer. Read pages 171-174.

E-102 Partly correct; "b" is best answer. Read pages 166 and 179.

E-103 Partly correct. First part is right, second is wrong. Read page 181.

E-104 Partly correct. Second part of sentence is wrong. Read page 182.

E-105 Partly correct. In the afternoon is correct, but not on north slopes. Read page 191.

E-106 Incorrect. Read page 184.

E-107 Partly correct. More deciduous forests are found in areas with moderate annual precipitation; however, "b" is not entirely true. Most areas are subject to droughts and heat waves. Read page 184.

E-108 Incorrect. Read pages 187-188.

E-109 Partly correct. Live fuels also extract water vapor from the atmosphere. Read pages 185-186.

E-110 Partly correct. It is not the same for all types of fuels. Read pages 188-189.

E-111 Partly correct. Read page 190.

E-112 Incorrect. Read page 193.

E-113 Partly correct. Day-to-day weather is the best means of determining fire potential. However, fire climate gives the fire control planner the average conditions to expect. Read page 197.

E-114 Partly correct. First part of sentence is correct. The oceans do influence inland temperatures in the summer. Read pages 200-201.

E-115 Partly correct; "c" also is correct, so "a" is the best answer. Read pages 200-201.

E-116 Partly correct. Latitude is one of the major influences. Others should be distribution of land and water surfaces and elevation. Read page 200.

E-117 Partly correct. Last sentence is incorrect. Read page 204.

E-118 Partly correct. It is caused by dry north and east winds, but time is wrong. Read page 204.

E-119 Partly correct. Precipitation and temperature are correct. See page 197 for others.

E-120 Incorrect. Read pages 210 and 139-140.

SECTION L

Circle the numbers of your L answers.

L-1 Partly correct. Read page 2.

L-2 Partly correct. Read page 2.

L-3 Partly correct. The standard atmospheric pressure is 29.92 inches of mercury, not millibars. Read pages 2-4.

L-4 Incorrect. Read pages 7-8.

L-5 Incorrect. Read page 7.

L-6 Partly correct. Read pages 7-8.

L-7 Partly correct. Convection does affect small-scale winds around a fire. In fact, the fire itself increases the convection in and around the fire. Read pages 8-9.

L-8 Partly correct. The amount of moisture does influence, but does not determine, the temperature. Read page 12.

L-9 Partly correct. It would be an inversion layer, no matter what its moisture content was. Read page 18.

L-10 Partly correct. A PIBAL may or may not go straight up when released. It would go straight up only if it encountered no winds. The lapse rate is the determining factor. Read page 18.

L-11 Partly correct. The sun should not shine directly on the thermometer bulb, but the shelter should not be shaded itself. The door of the shelter should open to the north so that the sun will not shine directly on the bulb. Read page 21.

L-12 Partly correct. Southwest-facing slopes would have highest surface temperatures in the afternoon, however. Read page 22.

L-13 Partly correct. Both "b" and "c" cause the temperature to be higher. Read pages 23 and 24.

L-14 Partly correct. Moisture also has something to do with it. Read page 25.

L-15 Partly correct. The amount of heat produced by friction would be small. Read pages 25-26.

L-16 Partly correct; "c" also could occur. Read page 27.

L-17 Partly correct. Strong winds near the surface tend to mix the air and prevent the establishment of a superadiabatic layer. Read page 27.

L-18 Partly correct. Only the stability is correctly described. Read pages 28-29.

L-19 Partly correct. Colder temperatures would be found at the bottom of the inversion and warmer temperatures at the top of the inversion. Read page 29.

L-20 Partly correct. Read page 32.

L-21 Incorrect. Read page 35.

L-22 Partly correct. True only if the air at 32° F. is saturated. Read pages 35-36.

L-23 Partly correct. Relative humidity is dependent upon temperature and pressure, but it is not the actual amount of moisture in the air. Read page 37.

L-24 Partly correct. One can assume that the air is very moist, but with this information, atmospheric moisture can be accurately defined. Read pages 37-41.

L-25 Incorrect. Read pages 38 and 39.

L-26 Partly correct. Transpiration would be greatest on a warm afternoon, but a sparse forest would not release as much moisture as the dense one. Read pages 39 and 41.

L-27 Partly correct. But more evaporation would occur over water than over the sparse forest. Read page 41.

L-28 Partly correct; "b" also is correct, so "c" is the best answer. Read page 42.

L-29 Partly correct. The increase in absolute moisture would increase the relative humidity, but the increase in temperature would decrease the relative humidity, so one might offset the other. Read page 43.

L-30 Partly correct. There would be some change in temperature, but the relative humidity change would not be as marked as that encountered in "d". Read pages 43-45.

L-31 Partly correct. Relative humidity is likely to be higher during the day in the forest stand. Read pages 45-48.

L-32 Partly correct, but one would need to know whether or not the air is saturated. Read page 50.

L-33 Partly correct. A temperature sounding would be better proof; however, cumulus clouds also are good indicators of instability. Read page 50.

L-34 Incorrect. These will not be known until the sounding is plotted and analyzed. Read page 51.

L-35 Partly correct; "d" is true, "c" is not. Read page 54.

L-36 Partly correct. Convection would occur, but other conditions are needed, such as moisture and a certain depth of the unstable layer. Read page 56.

L-37 Incorrect. Read pages 56 and 57.

L-38 Partly correct. This usually is what happens, but it is the result of radiation, cooling, and heating; "d" is a better answer. Read page 58.

L-39 Partly correct; "c" also is a factor. Read pages 59-60.

L-40 Partly correct. This would not be as significant as the relative humidity. Read pages 60-61.

L-41 Partly correct. The compression and expansion would change the layer's temperature lapse rate, however, and thus affect the stability. Read pages 55-57.

L-42 Partly correct. The heat wave does produce a hazardous fire-weather condition; however, the foehn-wind type is more critical because of increased wind speed and the low relative humidity. Read pages 60-64.

L-43 Partly correct. Cumulus type clouds are not. Read pages 65-66.

L-44 Partly correct. It does vary in location, but it is a zone of storminess; not clear weather. Read pages 71-72.

L-45 Partly correct. The constant-level chart currently is only used to represent pressure at the constant level of sea level, but it can be used at any level through the atmosphere. Read pages 73-74.

L-46 Partly correct. But usually it is characterized by cloudy or stormy weather, not good weather. Read pages 74-75.

L-47 Partly correct. Isobar patterns do sometimes show Highs and Lows, but "a" is a better definition of an isobar. Read page 73.

L-48 Partly correct. This is not necessarily true. The direction of the airflow could change either way. Read pages 75-76.

L-49 Partly correct. Surface friction does decrease, but this would allow the wind to increase in speed, rather than decrease. Read pages 77-78.

L-50 Partly correct, but the position of the jet stream affects weather of all seasons. Read pages 79-80.

L-51 Partly correct. This would be true for winter, as the land surface generally is cooler than the water in the wintertime. Read pages 80-83.

L-52 Partly correct, but "a" also is true. Read pages 83-84.

L-53 Incorrect. Read page 86.

L-54 Partly correct. Knowing the vertical component of a wind will let the firefighter know more about fire behavior, but just knowing whether a wind is upslope or downslope will not give the component as the speed also would be a factor. Read pages 86-87.

L-55 Partly correct; "b" also is true. Read pages 88-90.

L-56 Partly correct. This does cause turbulence, but a more important reason is "c". Read pages 88-89.

L-57 Partly correct. Eddies account for the gustiness of the wind. Read pages 90-91.

L-58 Partly correct. It is not necessarily a downslope flow, however. Read pages 90-91.

L-59 Incorrect. Read pages 92 and 63.

L-60 Partly correct; "b" also is correct, so "a" is the best answer. Read pages 93-96.

L-61 Partly correct. Thunderstorms do occur, but normally in a squall if the lightning strikes, precipitation also will occur. They usually are not dry thunderstorms. Read pages 95-96.

L-62 Incorrect. Read pages 99-100.

L-63 Incorrect. Air flows from the high-pressure area to a low-pressure area. Read pages 100-104.

L-64 Partly correct. Differences in terrain cause differences in heating, which cause the convective winds. Read page 108.

L-65 Partly correct. Time of occurrence is right, but direction of flow is wrong. Read pages 109-110.

L-66 Partly correct; "c" also is true, so "b" is the best answer. Read pages 109-111.

L-67 Partly correct; "d" is a better answer. Read pages 111-112.

L-68 Partly correct; "d" also is true, so "c" is the best answer. Read pages 112-113.

L-69 Partly correct. The cause is wrong. Read pages 113-115.

L-70 Partly correct. This may happen, but not necessarily. It is more likely to happen on lower slopes as the upvalley winds may not always completely fill the valley. Read pages 116-118.

L-71 Partly correct, but "a" is the best answer. Read pages 122-124.

L-72 Partly correct. Although sometimes masked by general winds or diurnal winds, winds from a thunderstorm generally are strong enough to be dominant. Read pages 124-125.

L-73 Partly correct. It is warm, but not dry or stable. Read pages 132-134.

L-74 Partly correct. The air mass characteristics will be modified, but the air mass will not be changed to an mT type until it moves over warm water. Read pages 129-130.

L-75 Incorrect. Read pages 130-136.

L-76 Incorrect. Read pages 132-133.

L-77 Partly correct. Only the second part of the statement is right. Read pages 132-135.

L-78 Partly correct; "b" also is true, so "d" is the best answer. Read page 137.

L-79 Partly correct. Description of the cold front is wrong. Read page 137.

L-80 Partly correct. Pressure does fall as the front approaches, but rest of sentence is incorrect. Read pages 138-139.

L-81 Partly correct. This would be true if the warm air above a warm front is moist and conditionally unstable, but not if this warm air is moist and stable. Read page 140.

L-82 Partly correct; "a" also is true, so "d" is the best answer. Read pages 146-150.

L-83 Partly correct. These both add moisture, only one of the ways; "a" is best answer. Read page 146.

L-84 Incorrect. Read page 147.

L-85 Partly correct. This is true, but "c" is the most important reason. Read pages 151 and 135.

L-86 Incorrect. Read page 154.

L-87 Partly correct. The description is for cirrocumulus. Read pages 156 and 140.

L-88 Partly correct; "a" is best answer. Read page 158.

L-89 Incorrect. Read page 161.

L-90 Partly correct. Droplets are smaller in drizzle, however. Read page 163.

L-91 Partly correct. The first part of the sentence is wrong. Read page 163.

L-92 Partly correct. This is not the type of precipitation that would be associated with cumulonimbus clouds. Read pages 159-163.

L-93 Partly correct. Minimum size is not a few feet in diameter. Read page 167.

L-94 Partly correct. Some triggering mechanism, such as orographic lifting, also is necessary. Read pages 167-169.

L-95 Incorrect. See map on page 168.

L-96 Partly correct. Firewhirls may occur, but not necessarily. Read pages 171-174.

L-97 Partly correct; "b" is better answer. Read pages 173-174.

L-98 Partly correct. However, chances are better that the thunderstorm would not even form. Read page 171.

L-99 Partly correct; "d" also is true, so "b" is the best answer. Read pages 176-177.

L-100 Partly correct. Dry thunderstorms occur most often in the West and Southwest, but that is not the reason they are called "dry". Read pages 177-178.

L-101 Partly correct; "b" also is true, so "c" is the best answer. Read pages 171-174.

L-102 Partly correct. "b" is best answer. Read pages 166 and 179.

L-103 Partly correct. There is some truth here, but it is not the right answer. The second part agrees with the first. Read page 181.

L-104 Partly correct. First part of sentence is wrong. Read page 182.

L-105 Partly correct. On southwest slopes, but not in the morning. Read page 191.

L-106 Incorrect. Read page 184.

L-107 Partly correct. Fuels on the ground do tend to become packed, but "a" is better answer. Read page 184.

L-108 Partly correct. Equilibrium moisture content over an extended period would be required; "d" is better answer. Read pages 187-188.

L-109 Partly correct. They are hygroscopic, but this is not the reason for their greater range in moisture content. Read page 185.

L-110 Partly correct. This is not the definition of timelag, but the standard conditions under which timelag is measured. Read pages 188 and 189.

L-111 Partly correct. Read page 190.

L-112 Incorrect. Read page 193.

L-113 Partly correct. Average temperataure is a part of fire climate, but fire climate also considers other weather elements such as precipitation, etc. Read page 197.

L-114 Partly correct. First part of sentence is correct. The oceans do influence inland temperatures, both in summer and winter. Read pages 200-201.

L-115 Partly correct; "d" also is true, so "a" is the best answer. Read pages 200-201.

L-116 Partly correct. Distribution of land and water surfaces is one of the major influences. Others should be latitude and elevation. Read page 200.

L-117 Partly correct. First sentence is incorrect. Read page 204.

L-118 Partly correct. In summer and early fall is correct, but the reason is wrong. Read page 204.

L-119 Partly correct. Wind speed and temperature are correct. See page 197 for others.

L-120 Partly correct. These storms cause wildland fires, but ordinarily the burned acreage is small. Read page 210.